

REACTING TO THE PAST: A DEVELOPMENTAL EXAMINATION OF THE EMOTION
REGULATION ROLE OF AUTOBIOGRAPHICAL MEMORY SPECIFICITY

BY

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Abstract

This study was designed to experimentally test the impact of the specificity of one's autobiographical memories on affect, and to examine how memory specificity may differentially impact emotional responses across development. In the literature on memory specificity, the Affect Regulation hypothesis (Williams, 1996; Williams et al., 2007) argues that recalling autobiographical memories in an overgeneral manner serves to decrease emotional distress through avoidance of the painful specific details of one's past. While there is evidence for connections between naturally-occurring variations in memory specificity and emotion-regulation in adults, the relationship between memory recall style and distress has not been directly tested in an experimental manner, and no studies have examined such processes in child samples. In this study, 93 children, adolescents, and young adults (8 – 28 years) were randomly assigned to recall negative memories in the Autobiographical Memory Test (AMT) in either a general or a specific manner. To control for the differential retrieval effort involved in the two remembering conditions, the memories were generated and audio-recorded during Session 1 and played back for the participants one to two weeks later, during Session 2. Pre- and post-tests of emotional states at this second session were used to evaluate the impact of memory recall condition on participants' affect. Analyses indicated that general recall was related to improved emotional state relative to specific recall. Further, individual differences in executive function and emotion regulation abilities contributed to these associations; for instance, individuals who were high in suppressive tendencies were more negatively impacted by the specific condition than those who were lower in suppression. Implications for models of autobiographical memory and emotion regulation, as well as interventions aimed at helping children and young adults cope with negative experiences, are discussed.

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Reacting to the Past: A Developmental Examination of the Emotion Regulation Role of Autobiographical Memory Specificity

Autobiographical memories, or memories for personally experienced events, are dynamically constructed mental representations (e.g., Bartlett, 1932; Conway & Pleydell-Pearce, 2000; Schacter, 1996). As argued by Conway & Pleydell-Pearce (2000) and others, the construction, and reconstruction, of one's autobiographical memories is regulated by control processes which seek to maintain consistency between one's view of themselves, their goals, their emotional state, and the event itself (Conway & Pleydell-Pearce, 2000; Wegner, 1994). In fact, it has been proposed that autobiographical memories serve as a "resource" for the maintenance or alteration of the individual's emotional state (Conway & Pleydell-Pearce, 2000; Gross, 2001; Robinson, 1986). For instance, individuals may emphasize past victories in their memories to increase their current positive emotion, ruminate on past problems or challenges (Wong & Watt, 1991), or selectively retrieve positive (rather than negative) memories or aspects of memories to strategically increase positive affect (Gross, 1998). Additionally, one may further attempt to moderate his/her emotional reactions to the remembered experiences by drawing on emotion regulation strategies such as cognitive reappraisal and suppression, to help them reframe the event in a more positive light while avoiding aversive aspects of the experience (Gross, 1998; Lazarus & Alfert, 1964). Therefore, it appears that the qualities of one's autobiographical memories play a critical role in the maintenance of the psychological and emotional status of an individual.

One quality of autobiographical memory that has received substantial attention in the literature over the past twenty-five years, due to its connection to psychological health and wellbeing, is autobiographical memory specificity. A large body of work finds that individuals

with a history of trauma and/or trauma-related psychopathology demonstrate lower levels of memory specificity than individuals without such histories (e.g., Henderson, Hargreaves, Gregory, & Williams, 2002; McNally, Lasko, Macklin, & Pitman, 1995; Williams & Dritschel, 1988). Consistent with the argument that individuals regulate their emotional states at least in part through their approaches to autobiographical remembering, it has been proposed that reduced levels of memory specificity in traumatized populations are reflective of individuals' attempts to control or reduce the negative feelings associated with these aversive past experiences (the Affect Regulation Hypothesis; Williams, 1996; Williams et al., 2007). In particular, this position argues that recalling past negative experiences in a general manner allows individuals to avoid the potentially distressing specifics of the event. However, there have been no experimental tests of the impact of memory specificity on emotional responses, and it is currently unknown whether children and adults are equally able to regulate their emotions through their memory recall style. Given developmental differences in the types and effectiveness of emotion regulation strategies that are employed by children and adults (e.g., Kalpidou, Power, Cherry, & Gottfried, 2004; Stansbury & Sigman, 2000; Stegge & Meerum Terwogt, 2007), we might expect differences in younger and older individuals' ability to benefit from the use of memory specificity as an emotional coping mechanism.

This study was designed to address these unanswered questions about memory specificity and emotional responses. Specifically, this investigation directly tests whether the nature of one's memory for negative experiences impacts one's emotional state, and whether this relationship changes across development. Further, this study also examined whether individual and age-related differences in coping and emotion regulation strategies influenced the relationship between memory specificity and emotion.

Memory Specificity and Emotional States

Autobiographical memory specificity first received attention in the memory literature after a number of investigations found that individuals under psychological stress (i.e., depressed adults or individuals with posttraumatic stress disorder) had difficulty recollecting specific past experiences (e.g., McNally, Lasko, Macklin, & Pitman, 1995; Williams & Dritschel, 1988). When asked to recall specific past events in response to cue words, these individuals tended to provide categorical or generic descriptions of past experiences, particularly when prompted with positively-valenced cue words. Shortly after these initial demonstrations, it was also found that this tendency toward “overgeneral” memories was also characteristic of adults with histories of childhood trauma (e.g., Henderson, Hargreaves, Gregory, & Williams, 2002; Hermans, Van den Broeck, Bells, Raes, Pieters, & Eelen, 2004). Since these early investigations, there has been a plethora of research supporting the link between trauma, or trauma-related psychopathology, and the overgeneral memory phenomenon (Dalgleish et al., 2007).

The majority of the work on overgeneral memory and trauma has employed the Autobiographical Memory Test (Williams & Broadbent, 1986). In this commonly used task of autobiographical memory specificity, participants are presented with a number of positive, negative, and neutral cue words and are instructed to provide a specific autobiographical memory (i.e., a one-time personal event) related to each cue. Participants are usually given 30 or 60 seconds in which to recall each memory, and each memory is coded as specific, overgeneral, or not a memory. A response is coded as “specific” when it refers to a one-time, autobiographical event that lasted less than 24 hours (e.g., “I went to the zoo for my twelfth birthday and saw a baby gorilla.”). An “overgeneral” code is given to a memory that is autobiographical in nature but refers to an event that lasted longer than 24 hours or refers to a category of events (e.g., “My

parents always let me go to the zoo on my birthday.”). Finally, a response is coded as “not a memory” if it is not autobiographical in nature or is not a memory (e.g., “I like zoos.”).

There are a number of hypotheses regarding the mechanisms responsible for overgeneral memory production in individuals with traumatic past experiences. One hypothesis draws on the observation that chronic stress is related to a dysregulation in cortisol production, and prolonged exposure to atypical levels of cortisol can result in the atrophy of hippocampal neurons (e.g., Sapolsky, 1996; Sapolsky, Krey, & McEwen, 1986). As the hippocampus is implicated in episodic memory consolidation and retrieval, this hypothesis would suggest that chronic stress would impair the construction and generation of rich episodic memories (e.g., Bremner, 2005; Nelson & Carver, 1998, Sapolsky, 1996). An alternate suggestion argues that impaired memory specificity reflects processing resource limitations, attributable to intrusive thoughts about past negative experiences and efforts aimed at avoiding said thoughts. However, both of these hypotheses would predict general impairments to the memory system, rather than the observed deficits that appear to be specific to autobiographical memory. In fact, studies that have accounted for working memory or general episodic memory abilities find that these factors fail to account for the relationships between trauma history or psychopathology and overgeneral memory (de Decker, Hermans, Raes, & Eelen, 2003; Wessel, Merckelbach, & Dekkers, 2002).

Instead, the most widely accepted explanation for the connections between poor autobiographical memory specificity and traumatic experiences and trauma-related psychopathology is the Affect Regulation Hypothesis (Williams, 1996; Williams et al., 2007). This model proposes that individuals with negative past experiences tend to recall overgeneral, as opposed to specific, memories of autobiographical experiences to avoid the negative affect

associated with their past experiences. In this way, Williams and colleagues argue, overgeneral memory recall may serve as a means of avoidant coping.

The hypothesis put forward by Williams for the development of overgeneral memory draws heavily on a model of autobiographical memory proposed by Conway and his colleagues. According to Conway and Pleydell-Pearce's (2000) model, our memories of personally-relevant experiences are organized in a hierarchical fashion, starting at the most broad category of lifetime periods (e.g., "when I was in college"), to general events (e.g., "attending football games in college"), and finally event-specific knowledge ("attending my first college football game with my roommate"). There are two ways in which individuals may search this hierarchical network in order to retrieve a memory: direct retrieval and generative retrieval (Burgess & Shallice, 1996; Conway & Pleydell-Pearce, 2000). Direct retrieval is a bottom-up, spontaneous recall process in which event cues automatically prompt the recall of event-specific knowledge. In contrast, generative retrieval is a top-down process that consists of an effortful, intentional search of memory. An intentional memory search may begin one of two ways: 1) at the level of the lifetime period, in which case the information from the lifetime period is then used to generate categorical information about the to-be-remembered event, or 2) at the level of the categorical information. Regardless of the entry point for the intentional search, the generation of a specific memory involves another step in the recall process, where individuals must use the categorical information to aid their retrieval of event-specific information. However, the Affect Regulation Hypothesis argues that if retrieval of event-specific information begins to activate aversive details, individuals may truncate their intentional memory search at the general events category, resulting in the retrieval of an overgeneral, rather than specific, event (Williams, 1996).

The Affect Regulation Hypothesis predicts that engaging in the repeated truncation of the memory search process, in order to avoid the negative affect associated with specific past events, should result in the eventual development of an overgeneral memory style. This hypothesis argues that if individuals are reaping an emotional benefit from avoiding event-specific knowledge, this benefit may serve as negative reinforcement for truncating retrieval, resulting in a *dysfacilitation* of the memory retrieval process and increasing the likelihood of truncated memory searches in the future. Further, Williams and colleagues (2007) suggest that when multiple truncated searches occur, the resulting network of intermediate descriptions becomes elaborated and reinforced. The next time an individual attempts to retrieve a related memory, they are increasingly more likely to activate other intermediate descriptions instead of a specific episodic memory, a phenomenon labeled as “mnemonic interlock.” In mnemonic interlock, the memory search process occurs in a lateral direction in the hierarchy rather than downwards (Barnhofer, de Jong-Meyer, Kleinpaß, & Nikesch, 2002). Therefore, the avoiding of negative details in one instance, through the activation of overgeneral memories, may increase the future likelihood of recalling events in the same manner, perhaps developing into a style over time (Williams et al., 2007). Also, given that generative retrieval of specific memories is more effortful than retrieval of generic memories, reduced cognitive abilities, such as executive function abilities, may exacerbate the development of an overgeneral recall style (e.g., Dalgleish et al., 2007).

Although overgeneral recall may be protective in the short term, the Williams model suggests that this approach to recall is associated with increased vulnerability to depression (e.g., Burnside, Startup, Byatt, Rollinson, & Hill, 2004; Raes, Hermans, Williams, Demyttenaere, Sabbe, Pieters, et al., 2006; van Minnen, Wessel, Verhaak, & Smeenk, 2005), as well as

increased likelihood of posttraumatic stress disorder (e.g., Dalgleish, Rolfe, Golden, Dunn, & Barnard, 2008; McNally, Lasko, Macklin, & Pitman, 1995). Further, clinical examinations of overgenerality and psychopathology suggest that the link between overgeneral memory and depression may be mediated by ruminative tendencies (Debeer, Hermans, & Raes, 2009; Raes, Watkins, Williams, & Hermans, 2008).

Williams and colleagues (1996) argue that, as overgeneral recall is a fairly stable trait that is not accounted for by mood congruency effects (e.g., Brittlebank, Scott, Williams, & Ferrier, 1993; Mackinger, Pachinger, & Leibserseder, 2000), overgeneral memory style is proposed to develop and become more stable over time. Therefore, children with highly aversive experiences, such as abuse or other traumas, may be one population that would be particularly likely to adopt an overgeneral recall style, in order to avoid the complex negative emotions associated with these past experiences. Younger individuals may be more likely to develop an overgeneral style because in their daily recollecting, they are less likely to retrieve specific memories in the first place (e.g., Drummond, Dritschel, Astell, O'Carroll, & Dalgleish, 2006). Coupling this tendency with a highly aversive and emotion-laden experience may lead to children's adoption of an overgeneral approach to recollecting as a coping strategy.

There is some existing indirect evidence for the Affect Regulation hypothesis, as previous work has found relationships between overgeneral recall and avoidance. For example, there is a significant positive correlation between avoidance, as measured on the Impact of Events Scale, and overgeneral memory production (e.g., Kuyken & Brewin, 1995; Wessel, Merckelbach, & Dekkers, 2002). Additionally, Hermans, Defranc, Raes, Williams, and Eelen (2005) found that less specific individuals reported higher levels of behavioral avoidance and thought suppression than more specific individuals. The model is also supported by research

showing that negative mood inductions can increase the likelihood of overgeneral recall.

McBride and Cappeliez (2004) assigned non-depressed college-aged participants to one of three mood induction conditions (elated, neutral, or depressed) before administering the AMT. The authors found that individuals in the depressed mood induction group produced more categorical memories than those in the elation induction group, although the comparison between the depressed group and the neutral group was not significant. This work is consistent with the view that negative affect may prompt avoidant recall patterns in the form of overgenerality.

Thus, the extant literature indicates that avoidant coping is related to overgeneral memory production and that negative moods induce greater overgeneral memory production, presumably as a strategy to regulate the negative affect. However, the evidence for whether overgeneral memory is actually effective in reducing negative affect is more tenuous and does not allow for causal inferences. For instance, a study by Hermans et al. (2008) attempted to tackle this issue; in this study, students who had unexpectedly performed poorly on an exam two weeks prior were recruited to complete the AMT and self-report measures of psychological stress. Seven weeks later, participants were again asked to provide self-reports of the stress associated with notification of their poor exam performance. This work found that individuals who reported fewer specific memories on the AMT at Week 2 reported less psychological stress related to the exam at Week 9, suggesting that the overgeneral memory style may have reduced negative affect.

Similarly, Raes et al. (2003) used a baseline assessment of memory specificity in healthy adults to identify two groups, one containing individuals who were highly specific on the AMT, and another group of people who provided very few specific memories (Raes, Hermans, de Decker, Eelen, & Williams, 2003). Individuals in these two groups were then asked to return to

the lab, where they participated in an easy and a frustrating task. This work found that the high-specific individuals reported greater subjective distress immediately following the frustrating task than individuals who were in the low-specific group, while there were no differences in distress levels between the high- and low-specific groups in response to the completion of the easy task.

The findings of Hermans et al. (2008) and Raes et al. (2003) are consistent with the hypothesis that negative appraisals increase avoidant tendencies. However, due to the fact that these analyses did not manipulate the nature of memory specificity, the precise role of recall style in reducing negative affect is not clear, as these patterns could be explained by the operation of other variables that may differ with memory specificity performance, such as cognitive control processes and emotion regulation abilities. Therefore, this study was designed to provide a strong test of how the specificity of memories for negative events impacts emotional state.

To address this goal in the current investigation, the specificity of memory recall was experimentally manipulated across participants, such that half of the participants were assigned to recall specific events while the other half were assigned to recall general categories of events. Additionally, the experiment was conducted over two sessions in order to account for potential differences in the effort required to recall specific memories versus general memories. The retrieval of specific information has been found to be more cognitively effortful than the retrieval of categorical events (Haque & Conway, 2001). As increased cognitive effort is related to increases in negative affect (e.g., Garbarino & Edell, 1997), potential differences in negative affect following memory generation could be attributable to the differential effort required of the two retrieval conditions. In order to control for these differences in cognitive effort, participants

recalled their memories during the first session, and they listened to and rated their emotional responses to these memories during the second session.

The Role of Emotion Regulation Abilities and Executive Function

Although the Affect Regulation Hypothesis predicts that specific and general recall should produce different levels of emotional responses, the manner in which individuals cope with the elicited emotions in their specific or general memories should also be expected to contribute to their emotional reactions to different types of memories. And in fact, there is a large literature on the ways in which individuals may engage in emotion regulation to modify their responses to emotional information. Emotion regulation consists of intrinsic and extrinsic attempts to modify one's level and type of emotional response (Calkins, 1994; Gross, 2001; Thompson, 1994) and as such, individuals' emotion regulation abilities are expected to contribute to emotional responses to negative memories. The literature suggests that emotion regulation can be automatic or effortful (Cole et al., 1994; Gross & Thompson, 2007), and involves not only the reduction of emotional intensity but also the production and maintenance of appropriate emotional responses (Cole et al., 1994; Calkins & Hill, 2007).

Two common approaches to emotion regulation are reappraisal and suppression, which, according to Gross and John (2003), operate at different time points during the coping process. Reappraisal is described as an "antecedent-focused strategy," meaning that it operates early in the retrieval process, before the memory trace and its associated emotional response are fully generated. Conversely, suppression is described as a "response-focused strategy," meaning that this strategy is employed late in the retrieval process. Rather than modifying one's view of an event, suppression alters the expression of the emotions that are generated. Therefore, in the context of memory retrieval, reappraisal should be related to the content of the memory that is

retrieved, while suppression should be related to individuals' emotional responses to that memory content.

The ability to respond appropriately to and regulate one's response to the emotional content in negative memories may further rely on the skills of modifying one's memory by focusing one's attention on the positive features of the memory while inhibiting negative emotional responses. As examined in a seminal study by Miyake and colleagues (2000), the cognitive abilities of memory updating, attentional shifting, and inhibition are interrelated components of what is jointly described as executive function. These executive function abilities initiate and stop behavior, monitor and change actions, and plan future behavior. In the context of autobiographical memory retrieval, executive function abilities are the control processes that plan and enact the selection of particular memories (or aspects of a memory), inhibit the retrieval of highly emotional responses to these memories, and conduct the constant modifications and maintenance of the memory in order to sustain a more positive emotional state and view of the event (e.g., Band & Weisz, 1988; Miller & Green, 1985; Thompson, 1994).

Therefore, another goal of the current investigation was to examine how measures of executive function and emotion regulation abilities were related to participants' responses in the two memory conditions. It was expected that both emotion regulation and executive function abilities would be positively related to emotional responses to the retrieval of negative memories. If specific recall does indeed generate a greater level of negative affect than general recall, specific memories should require that individuals recruit a greater amount of emotion regulation and executive function resources in order to regulate the associated emotional content of negative experiences. As such, in our study, we expected that emotion regulation abilities and

executive function should be positively related to decreased negative affect and increased positive affect over time, particularly in the specific condition.

Developmental Differences in Responses to Memory Specificity

Another major goal of this investigation was to look at whether emotional responses to specific and general negative memories vary across childhood and adolescence. The developmental literature provides several reasons to predict age differences in these relationships. First and foremost, the ability to engage in the adaptive regulation of emotion appears to change dramatically across childhood (e.g., Calkins, 1994; Cicchetti, Ganiban, & Barnett, 1991; Kopp, 1989; Thompson, 1994), and these changing abilities have implications for children's capability to cope with memories of negative past experiences. While most of the literature that has examined the development of emotion regulation abilities has focused on infancy and early childhood (e.g., Eisenberg, Champion, & Ma, 2004; Thompson, 1994), additional work finds that emotion regulation abilities continue to develop and become more sophisticated across childhood and adolescence (Beauregard, Levesque, & Paquette, 2004; Calkins, Gill, Johnson, & Smith, 1999; Calkins & Johnson, 1998; Kopp, 1989). Indeed, this work suggests that the ability to employ emotion regulation strategies such as avoiding emotional expression (i.e., suppression) and re-evaluating negative events in a more positive light (i.e., reappraisal) continues to develop across adolescence. Further, there is also evidence that not only does the use of emotion regulation strategies increase with age, but the use of said strategies also becomes more effective (Nolen-Hoeksema, Girgus, & Seligman, 1992; Neshat-Doost, Taghavi, Moradi, Yule, & Dalgleish, 1998). For instance, in a five-year longitudinal study of cognitive styles and depression in children from the age of 8 to 13, Nolen-Hoeksema, Girgus,

and Seligman (1992) found that as age increased, so did the relationship between children's coping abilities and their concurrent levels of psychological wellbeing.

These developmental differences in emotion regulation and coping may be due, at least in part, to developmental improvements across childhood in gross motor and basic cognitive abilities; these basic developmental building blocks are related to improvements in the ability to regulate one's own behavior, interpret the behaviors and emotions of others, and use information from one's social context to respond appropriately (e.g., Kopp, 1982; 1989). Developmental differences in emotion regulation may also come about due to differences in children's ability to understand and recognize complex emotions such as fear and anger in themselves and others (Gagnon, Gosselin, Hudon-ven der Buhs, Larocque, & Milliard, 2010; Gosselin & Larocque, 2000; Vicari et al., 2000); if children are not able to identify emotions appropriately or understand their sources, then they may be limited in their ability to regulate their reactions to this emotional content. Further, the development of emotion regulation abilities appears to hinge on the scaffolding of appropriate responses by parents and caregivers (e.g., Calkins, 1994). Indeed, socio-cultural models of memory development (Fivush, 1991; Fivush & Fromhoff, 1988; Fivush & Nelson, 2006; Vygotsky, 1978) suggest that children depend on adults to help them cope with and find meaning from negative past events – a task that may be too cognitively taxing for children to perform on their own (e.g., Fivush, et al., 2007; Rogosch, Cicchetti, & Toth, 2004). Thus, both internal and external factors appear to influence to gradual development of effective emotion regulation strategies across childhood and adolescence.

Finally, as mentioned in the previous section, the ability to effectively regulate one's emotions in response to negative experiences appears to rely on the complex coordination of a suite of cognitive skills, which also improve with age. It has been suggested that the ability to

respond appropriately to the emotional content in memory may rely on the skills of modifying one's memory by focusing one's attention on the positive features of the memory while inhibiting negative emotional responses (e.g., Miyake et al., 2000; Band & Weisz, 1988; Miller & Green, 1985; Thompson, 1994). The developmental literature on executive function indicates that, parallel to the developmental trajectory of emotion regulation skills, executive function abilities also increase gradually over childhood and adolescence (Anderson, Anderson, & Lajoie, 1996; Baker, Segalowitz, & Ferlisi, 2001; Best & Miller, 2010; Huizinga, Dolan, & van der Molen, 2006; Lehto, 2004), although there is variability in terms of when adult-like performance is demonstrated between the three executive function abilities.

In regard to working memory, there appears to be linear increases in working memory abilities throughout childhood and into adolescence (e.g., Gathercole, Pickering, Ambridge, & Wearing, 2004; Luciana & Nelson, 2005). For instance, Luciana and Nelson (2005) reported consistent age-related improvements on a variety of non-verbal working memory tasks between the ages of 4 and 20 years. In terms of shifting, it appears that the ability to shift your attention between options reaches adult-like levels by about age 15 (Cepeda, Kramer, & Gonzalez de Sather, 2001; Davidson et al., 2006; Huizinga et al., 2006; Kray, Eber, & Lindenberger, 2004). Further, Davidson and colleagues (2006) found that as age increased, reaction time decreased while accuracy increased, suggesting that older participants are more likely to engage in the meta-cognitive monitoring of their responses during shifting (Best & Miller, 2010). Finally, in terms of inhibition, the literature on the developmental patterns in this domain are mixed. Some work finds that inhibition improves dramatically across early childhood, between the ages of about 5 to 8 years (Romine & Reynolds, 2005), and these improvements are particularly observed on tasks that require both working memory and inhibition (Carlson, 2005; Gerstadt et

al., 1994). However, other work finds that inhibition skills continue to improve into adolescence (Bedard et al., 2002; Klenberg, Korkman, & Lahti Nuuttila, 2001; Ridderinkhof & Van der Molen, 1995); the most consistent work that evidences later inhibition improvements relies on the use of computerized tasks and the analysis of reaction time (see Best & Miller, 2010, for a review).

Therefore, the general pattern of executive function abilities appears to indicate age-related improvements in memory updating, shifting, and inhibition skills through childhood and in some cases, into adolescence. If these cognitive skills are related to one's ability to apply and benefit from the application of emotion regulation strategies, then developmental increases in emotion regulation would be expected to, at least in part, be explained by changes in executive function abilities across childhood and adolescence. In fact, there is some evidence that links executive function abilities with the effectiveness of emotion regulation across development. For instance, Cummings (1987) reports that 4-5 year olds who engaged in greater attentional inhibition were more able to regulate their emotions while witnesses an argument between two adults. Further, in a study of older children and early adolescents in boarding school, children who shifting their attention to think about the positive components of being away from boarding school were found to have lower reports of homesickness (Harris & Lipian, 1989). Therefore, as argued by Thompson (1994), behavioral and cognitive emotion regulation strategies appear to draw heavily on basic cognitive abilities such as memory updating, shifting, and inhibition.

In the current investigation, it was expected that children would demonstrate more negative reactions to listening to their memories than would adults, particularly if they were assigned to the Specific condition. One of the reasons that age-related differences were expected is the gradual development of executive function and emotion regulation abilities across

childhood and adolescence, abilities which contribute to one's ability to cope with emotion in memory. Both emotion regulation and executive function skills were expected to positively relate to affect regulation, but these skills were predicted to be more strongly implicated in the reacting to specific memories than to general memories, due to the assumption that specific memories generate a greater amount of negative affect relative to general memories.

Aims of this Research

This study was designed to extend earlier research on overgeneral memory and emotion by examining whether an experimental manipulation of memory specificity influenced participants' levels of positive and negative affect. Specifically, we used an experimental paradigm to investigate whether individuals assigned to a specific recall condition experienced more negative (and fewer positive) emotional reactions than individuals assigned to a general recall condition, and whether these effects varied with age. Further, this study examined how age-related and individual differences in cognitive abilities and coping strategies contributed to the influence of memory specificity on affect.

To address these aims, children, adolescents and young adults were asked to generate specific or general memories and an experimental procedure was used to examine their emotional responses to their memories. During Session 1, participants completed the Autobiographical Memory Task, in which they first completed a baseline test of specificity before being randomly assigned to recall negative memories in either a specific or general fashion. The baseline test of specificity was conducted to examine whether differences in tendencies toward recalling in a specific or general fashion influenced the impact of the assigned recall style on affect. While the traditional AMT employs positive, negative, and neutral cue words, all of the cue words that were used in this study, both during the baseline and the

experimental sessions, were negatively-valenced, as we were particularly interested in how memory specificity may relate to one's ability to regulate their emotions in response to negative memories. During Session 2, participants completed ratings of their emotional states before and after listening to the memories that they provided in Session 1. Participants also completed a measure of executive function ability, as well as assessments of depressive symptoms, reappraisal strategies, suppression strategies, and rumination. Measures of depressive symptoms and ruminative strategies were included as control variables, as indirect indices of maladaptive emotional coping or regulation.

Specific Hypotheses

Hypothesis 1: Memory exposure in the Specific condition was expected to increase negative affect and decrease positive affect relative to baseline levels, while affect was expected to remain more stable in the General condition.

Hypothesis 2: The influences of memory specificity on affect were expected to be stronger for younger children than for older adolescents and young adults.

Hypothesis 3: Higher self-reported use of the emotion regulation strategies of reappraisal and suppression was hypothesized to relate to more positive emotional states (reduced negative affect and increased positive affect). In this context, as overgeneral memory is hypothesized to serve as an avoidant mechanism, the impact of suppression on decreasing negative affect may be stronger than the impact of reappraisal on affect. It was also possible that the contribution of emotion regulation and executive function abilities would interact with condition, such that Specific recall would draw more heavily on these abilities than would General recall.

Hypothesis 4: Any observed age-related differences in the impact of memory specificity on affect were expected to be at least partially explained by executive function and/or emotion

regulation abilities. In particular, higher levels of executive function abilities, and a greater use of emotion regulation strategies, were expected to be related to less negative affect and greater positive affect relative to baseline.

METHOD

Participants.

A total of 93 participants participated in this research, 32 males and 61 females. The younger participants (age 8 – 17 years; $M_{\text{age}} = 11.95$ years, $SD = 2.06$ years) were recruited from surrounding Kansas City schools, and the college-aged participants (age 18-28 years; $M_{\text{age}} = 19.24$ years, $SD = 1.87$ years) were recruited from the university's introductory psychology research pool. The younger participants received \$10 gift certificates for participation in each of the two sessions, and the college-aged participants received research credits for each session. All participants used English as their primary language and were typically developing.

A power analysis was conducted to determine the required sample size for this study. The reference data were drawn from Yim et al. (2010), a study which reports changes in mood on the PANAS and PANAS-C in response to a negative task in a sample of 9-12 year olds and a sample of 18-25 year olds (Yim, Quas, Cahill, & Hayakawa, 2010). Using 80% power as a criterion and the proc glmpower procedure in SAS, the analysis indicated that 80 participants were needed. Thus, it appears that our sample size was appropriate for our proposed analyses.

Procedure

The study was conducted over two individually administered sessions, one to two weeks apart. Before the beginning of the first session, participants (or parents, for individuals younger than 18 years) completed an informed consent form, and participants were given a copy of the form for their records. If the participant was under the age of 18 years, verbal child assent was

also obtained. During Session 1, participants completed the Autobiographical Memory Task (AMT), which consisted of two components. Participants first responded to five memory cues using the traditional AMT protocol, in which all participants are asked to recall specific memories. The first five cues were administered to collect a baseline of individuals' recall style. Participants were then randomly assigned to either the General or the Specific recall condition, in which they recalled fifteen memories in the assigned recall style. All of the memories that participants provided were audio-recorded. Participants also completed ratings of their emotional state before and after the AMT. Following the memory generation procedure, participants completed measures of executive function and emotion regulation.

During Session 2, conducted one- to -two weeks after Session 1 ($M = 9.56$ days, range 7 – 15 days), participants listened to the audio recording of the memories that they had provided during the experimental portion of the AMT during Session 1. Ratings of current emotional states were collected before and after the memory exposure task. Session 2 ended with the completion of a self-report measure of rumination, depressive symptoms, and a demographic questionnaire.

Measures

Autobiographical Memory Task. The generation of autobiographical memories was conducted in an interview format. First, to provide an index of participants' pre-existing autobiographical memory "style", an abbreviated version of the traditional Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) was conducted. Participants were presented with five cues and asked to provide specific general memories in response to each of the cues. The cue words for this baseline test were *stress*, *argue*, *punishment*, *conflict*, and *frustrate*.

Participants were then randomly assigned to recall either fifteen specific memories (in the Specific condition) or fifteen general memories (in the General condition) in response to the following 15 negative cue words: *sorry, angry, clumsy, hurt, lonely, unhappy, bored, failed, scared, hate, depressed, upset, abandoned, disgusted, and gloomy*. The cue words for both the baseline and the experimental portions of the AMT were based off of the cue words used in McNally et al., (1995). However, as McNally and colleagues used both positive and negative cues, and we were focused on negative memories only, the additional negative cue words were drawn from the Durda and Buchanan (2006) norms, matched for frequency and reading level. Each cue was printed on 4” x 6” index card in lower case lettering, and participants randomly selected the order of the cards from the deck of index cards. Individuals were given 60 seconds to recall a memory (either general or specific, depending on the condition) in response to each cue word, and the memories were audio-taped for use in Session 2.

Specific Condition: The instructions for the Specific memory condition and baseline test were the same as those used in the previous literature using the AMT. Participants were provided with examples of specific memories. During the entire procedure, if participants did not initially recall an appropriate memory, they received a prompt from the researcher (e.g., “*Can you tell me about a specific time related to [cue word]?*”).

General Condition: The instructions for the General memory condition were taken from the AMT-R (Daggleish et al., 2007); participants were told that the memories they recall should be of a certain category of events, or a series of events, that happened to them at different times. Participants received examples of general memories. If participants did not initially recall an appropriate, general memory, they received a prompt from the researcher (e.g., “*Can you tell me*

about a general event related to [cue word]?”). The task instructions for the baseline and both conditions are included in Appendix A.

Memory Exposure Task. The Memory Exposure Task was carried out during Session 2. Between the first and second sessions of the experiment, all memories were coded based on whether they were autobiographical in nature, their specificity, and their valence. The coding procedure, and reliability, is described in greater detail in the AMT Coding section, below. On the basis of this coding, the researchers selected 10 of the 15 provided memories for the participant to listen to during Session 2. The selected memories were chosen based on adherence to the task instructions (e.g., only general memories were selected for playback from the audio-recordings of individuals who were assigned to the General condition). The narrowing of the number of memories used in Session 2 was to account for the possibility that even with prompts reminding participants about the instructions, not every provided memory was expected to adhere to the instructed recall type. In fact, in this study we found that the number of appropriate memories that were generated ranged from 10 to 15 memories, and did not differ by age or condition. When more than 10 appropriate memories were generated, the first 10 memories were used. Before participants listened to their audio-recordings on headphones, they received the following instructions: *“During this time, you should think about the [specific memories/general categories of events] that you told us about earlier.”* The experimenter then pressed play on the recorder. The experimenter remained in the room, and the audio-player indicated when the audio file had finished playing over the headphones, at which point the experimental turned off the audio player and participants removed the headphones.

Emotional State Assessments. Before and after the Autobiographical Memory task in Session 1, and before and after the Memory Exposure task in Session 2, the Positive and

Negative Affect Schedule for Children (PANAS-C; Laurent et al., 1999) was administered to the child sample, and the parallel measure for adults, the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), was administered to the college-aged sample. Therefore, this measure was completed four times throughout the experimental protocol. The PANAS has been widely established as a measure of distress and positive mood state, and it contains both positive affect (PA) and negative affect (NA) subscales. The subscales consist of positively valenced adjectives (e.g., excited, strong) and negatively valenced adjectives (e.g., sad, angry), and participants rate how applicable each adjective is to their current mood state on a scale of 1 (very slightly or not at all) to 5 (extremely). Scores for each of the two subscales (positive affect and negative affect) were calculated separately for each of the four time points; an individual's positive affect score was calculated as an average of their positive affect ratings, while his/her negative affect score was calculated as an average of their negative affect ratings. As such, scores closer to 5 on either subscale indicates a greater level of emotionality. For the sake of clarity, the four positive affect scores were labeled PA1 (positive affect before the Memory Generation Task), PA2 (positive affect after the Memory Generation task), PA3 (positive affect before the Memory Exposure task) and PA4 (positive affect following the Memory Exposure task). Scores for the negative affect subscale (NA1 through NA4) were calculated in the same way. The PANAS and PANAS-C are included in Appendix B and Appendix C, respectively.

Executive Function. Executive function abilities were assessed using the Wisconsin Card Sorting Task (WCST; Berg & Grant, 1948; Heaton, 1981). The WCST is a test of individuals' ability to shift attention and update their memory, and is a commonly used measure of executive function in clinical, neuropsychology, and cognitive investigations (e.g., Butler, Retzlaff, &

Vanderploeg, 1991; Rabin, Barr, & Burton, 2005). A number of investigations have validated the use of the WCST with participants as young as six years old (e.g., Riccio, Hall, Morgan, Hynd, Gonzalez, & Marshall, 1994; Welsh, Pennington, & Grossier, 1991); however, this task does not always yield wide-ranging age differences. For instance, Rebok et al. (1997) found increases in the number of categories completed and decreases in the number of perseverative errors committed in children between the ages of 8 to 10, but developmental differences were not observed in adolescents. Similarly, other work finds that perseverative errors, in which a participant continues to provide a response even after receiving feedback that their response is incorrect, reach adult levels by about age 12 years (e.g., Chelune & Baer, 1986; Levin et al., 1991; Welsh et al., 1991).

To begin the task, four stimulus cards are first placed on the table (one red triangle, two green stars, three yellow crosses, and four blue circles). Participants are then given 64 cards on which the color, shape, and number of the shapes vary (e.g., three green triangles, one red circle), and they are asked to sort the cards one at a time. Each time a card is sorted, the participant receives feedback as to whether the card was sorted correctly, and the goal of the task is for the participant to determine the correct sorting rule. Throughout the task, the experimenter changes the sorting rule once ten cards have been correctly sorted in one category, and the participant must then determine the new rule. The order of the required categories was consistent across all participants. The average number of categories that were completed was 4.31 ($SD=.78$), with a range of 2 to 5. The number of categories completed did not differ according to group, $t(92) = .96, p = .33$, or according to gender, $t(92) = -1.33, p = .19$. However, there was a significant effect of age on the number of categories completed, $F(1, 92) = 8.27, p = .01$, such that older participants completed significantly more categories than did younger participants.

Executive function was operationally defined as the number of perseverative errors committed. For example, if an individual sorted a card using the category “shape,” received feedback that they were incorrect in their sort, and then proceeded to sort the following card again according to shape, their behavior would be scored as a perseverative error. Therefore, the possible range of scores for perseverative errors is from 0 to 63, where higher scores indicate poorer executive function abilities; a score of 0 would reflect no perseverative errors and a 63 would reflect a perseverative error on every trial. Individuals’ performance on this task was recorded by hand; for each card sorted, researchers documented the correct category, the category that the individual sorted by, and whether their sort was correct or incorrect.

Several examinations of performance on the WCST suggest this test’s ecological validity; the number of perseverative errors on the WCST have been shown to predict the likelihood of independent living (Little, Templer, Persel, & Ashley, 1996), job status and ability to perform everyday tasks (Kibby, Schmitter-Edgecombe, & Long, 1998), and accuracy on a grocery shopping task (Rempfer, Hamera, Brown, & Cromwell, 2003). Investigations have found also relationships between the WCST and the Category Test, another often-used measure of reasoning and rule learning (Pendleton & Heaton, 1982; Perrine, 1993).

Emotion Regulation Abilities. Emotion regulation abilities were measured with the Emotion Regulation Questionnaire in the young adult sample (ERQ; Gross & John, 2003) and the child-version of the same questionnaire for the child sample (Emotion Regulation Questionnaire for Children and Adolescents - ERQ-CA; Jaffe, Gullone, & Hughes, 2010). Both measures capture the emotion regulation strategies of cognitive reappraisal and expressive suppression, and they use parallel questions with the ERQ-CA modified for age-appropriate language. Scores for reappraisal and suppression are calculated separately as summed values of

the raw scores, and these scores are not adjusted or standardized for age. Both the original (Gross & John, 2003) and child-adapted (Jaffe et al., 2010) versions of the questionnaire demonstrate sound psychometric properties. Gross and John (2003) report a Cronbach's alpha coefficient for the Reappraisal subscale of .79 and .73 for the Suppression subscale, as well as a 3-month test-retest reliability of .69. The ERQ is located in Appendix D, and the ERQ-CA can be found in Appendix E.

Depressive Symptoms. To control for any variation in participants' depressive symptoms, the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used with the adult sample and the equivalent Center for Epidemiologic Studies Depression Scale for Children (CES-DC; Weissman, Orvaschel, & Padian, 1980) was used with the child sample. Good validity has been observed on this scale when used with Caucasian, Hispanic, and African American participants (Roberts, 1992; Roberts, Vernon, & Rhoades, 1989). Cronbach's alphas in these samples range from .84 to .90, and re-test reliability has been found to range from .51 to .67 in two- through eight-week intervals (Radloff, 1977; Comstock & Helsing, 1976; Weissman, Shlomoskas, Pottenger, Prusoff, & Locke, 1977). This measure asks participants to identify ways that they felt or behaved in the past week (e.g., "In the past week, I felt that everything I did was an effort), and asks them to indicate how often this occurred on a scale of 0 (*none of the time (less than 1 day)*) to 3 (*most or all of the time (5-7 days)*). The child version also asks how often participants have felt a particular way in the past week (e.g., "I was bothered by things that usually don't bother me") but the rating options are "*not at all*", "*a little*", "*some*", or "*a lot*". An overall depression score was calculated as a continuous variable, with higher scores on the CES-D or CES-DC indicating higher levels of depressive symptoms, and a score of 15 or above on

either of these measures seen as an indicator of clinically significant depressive symptoms (see Appendix F for the CES-D and Appendix G for the CES-DC sample measures).

Rumination. To control for potential differences in intrusive thoughts and/or maladaptive emotion coping strategies, a measure of rumination was included. Rumination in the college-aged sample was collected using the Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991), a 22-item self-report questionnaire developed from the Response Style Questionnaire (RSQ; Nolen-Hoeksema, 1987). The RRS has been shown to have good internal consistency (Cronbach's $\alpha = .82$), moderate one-year test-retest reliability (.47), and predictive validity for depression (Just & Alloy, 1997; Nolen-Hoeksema, 2000; Nolan, Roberts, & Gotlib, 1998). In the child sample, the Children's Response Styles Questionnaire (CRSQ; Abela, Vanderbilt, & Rochon, 2004) was used. The CRSQ, the equivalent child-version of the RSQ, is a 25-item self-report measure that has a consistent factor structure as the RRS (Verstraeten, Vasey, Raes, & Bijttebier, 2010). Scores are calculated as raw totals, and are not age-adjusted. The CRSQ also demonstrates moderate internal consistency (Cronbach alphas range from .79 to .82), and this measure has been found to be predictive of depressive symptoms in a sample of third through sixth graders (Abela, Aydin, & Auerbach, 2007). See Appendices H and I for examples of the measures.

Demographic Questionnaire. The Demographic and Background Questionnaire asked for the participant's birth date, gender, and ethnic background, to serve as control variables in the analyses. A copy of the demographic questionnaire is included in Appendix J.

Coding of Autobiographical Memories

Each memory was coded on three dimensions. First, the responses were coded as either autobiographical memories or not. Next, each autobiographical memory was coded for

specificity (specific or general) and valence of the memory (negative or positive/neutral). One researcher coded all of the narratives, and another researcher coded 20% of the narratives (19 transcripts) for reliability. Cohen's Kappa scores were calculated for each of the coding dimensions, and reliability was very good. For the codes that assessed whether the responses were autobiographical memories or not, there were no deviations in the scores given by the two coders ($K_{ABmemory} = 1.00$). The coefficient for whether memories were specific or overgeneral also indicated very strong reliability ($K_{specificity} = 0.97$), and finally, the Cohen's Kappa for memory valence also indicated perfect reliability on that coding dimension ($K_{valence} = 1.00$).

RESULTS

Descriptive Analyses

The means and standard deviations of the variables of interest, according to recall condition, are presented in Table 1. As can be seen, individuals in both groups tended to provide specific memories on the baseline autobiographical task, and the overwhelming majority of memories provided on both the baseline task and the experimental task were about negative experiences. In terms of ratings of positive and negative affect, it appears that levels of negative affect were lower, on average, than levels of positive affect. Additionally, while negative affect levels remained constant across the four measurement points for both conditions, positive affect decreased across the four assessment points, from PA1 to PA4.

There was a large amount of variability in executive function ability, as captured by the number of perseverative errors committed. While the average number of perseverative errors was about 7 for the Specific condition and about 8 for the General condition, the number of these errors committed by participants in this sample ranged from 4 to 17; at the high end of this range, more than 25% of the responses given on the WCST were perseverative errors. In terms of

emotion regulation scores, individuals reported fairly high usage of reappraisal strategies in both conditions, and relatively lower usage of suppression techniques. Exploratory analyses reveal no differences according to age in reappraisal strategies, $F(1, 91) = .00, p = .99$, or suppression, $F(1, 91) = .00, p = .97$. Participants also reported that, when they were sad, blue, or depressed, they ruminated on these experiences about half of the time. There were no differences in rumination strategies according to age, $F(1, 92) = 2.01, p = .16$, or gender, $t(92) = .34, p = .74$.

Additionally, participants reported a wide range of depressive symptoms, and 34 participants met the clinical cutoff (i.e., a score of 15 or higher on the CES-D or CES-DC; Barnes & Prosen, 1984; Mojarrad & Lennings, 2002; Weissman, Orvaschel & Padian, 1980) for potential depressive disorder. This number is relatively high, which may be partly due to the fact that participants completed the depressive symptom assessment after the Memory Exposure task, so they had recently listened to their negative memories. Measures of depressive symptoms, emotion regulation and ruminative tendencies were administered after the memory tasks and emotion ratings in order to avoid influencing participants' emotional states and/or reaction to the memory task.

To determine whether the individuals who met the clinical cut-off for depression according to the CES-D were unequally distributed between the two conditions, a chi-square test of independence was conducted. This analysis revealed no differences between the recall conditions in the number of people who met the clinical cut-off for depression ($\chi^2(1) = 0.04, p = .85$). There also did not appear to be systematic gender differences in depressive symptoms in this sample; there was no difference in the number of depressive symptoms between genders ($t(1) = .23, p = .82$), and there were no differences by gender in number of individuals who met the clinical cut-off for depression ($\chi^2(1) = 0.02, p = .89$). Finally, there were no differences

according to age in the level of depressive symptoms reported, $F(1, 92) = .40, p = .53$, and there were no differences in age according to whether individuals met the clinical cut-off for depression or not, $t(92) = -1.17, p = .24$.

We conducted the baseline AMT assessment to capture whether participants were specific in their memory retrieval when the instructions were not manipulated, with the goal of examining whether the impact of memory retrieval condition assignment on affect was influenced by participants' naturally occurring style of remembering. However, we found that baseline specificity did not predict positive [$F(1, 89) = .34, p = .56$] or negative [$F(1, 89) = .22, p = .64$] affect levels in response to the Memory Generation task, and the interaction between baseline specificity and condition was not significant predictor for either positive or negative affect.

Preliminary analyses assessed correlations between the variables of interest in this study, and these correlations are presented in Table 2. In this table, age has been partialled out from all other correlations. This table indicates that age was related to fewer negative memories retrieved during the experimental portion of the AMT. Not surprisingly, emotion prior to the Memory Exposure task was strongly related to emotion ratings following the Memory Exposure task. Further, negative emotion levels were related to depressive symptoms and ruminative coping, and the use of reappraisal strategies was negatively related to depressive symptoms. Curiously, neither emotion regulation (reappraisal and suppression) nor executive function (perseverative errors) were related to age, even though these scores were not calculated as age-corrected scores. These relationships were explored more thoroughly in the inferential analyses section of this paper.

(Table 2 about here)

As discussed earlier, this study was conducted over two sessions to control for the potential differences in cognitive effort between recalling memories in the two conditions. In particular, we were concerned that the greater cognitive effort related to specific memory generation, as compared to general memory generation, would negatively impact mood during the AMT task. We were interested in whether this was indeed the case. To answer this question, we conducted two repeated measures GLMS, one predicting PA1 and PA2 from condition, and the second GLM predicting NA1 and NA2 from condition. Therefore, time served as the repeated measure factor. This set of analyses found that there was no interaction between time and condition for positive affect, $F(1, 89) = .26, p = .61$, or negative affect, $F(1, 89) = .34, p = .56$, indicating that being asked to engage in the process of generating specific or general memories did not significantly impact individuals' immediate emotional states.

Inferential Analyses

The inferential analyses were carried out in two stages. The first set of inferential analyses addressed Hypotheses 1 and 2: Does memory specificity influence affect, and how is this relationship impacted by age? In this analysis, we examined whether memory recall condition and/or age predicted positive and negative affect scores, controlling for gender, depressive symptoms, and rumination. The second set of inferential analyses addressed Hypothesis 3 and 4 by examining whether the addition of emotion regulation and executive function abilities helped to explain the relationship between memory specificity, age, and affect. Specifically, the second set of analyses looked at 1) whether executive function abilities (i.e., perseverative errors) and frequency of coping strategies (i.e., reappraisal and suppression)

contribute to individual differences in the effects of memory specificity on mood, controlling for depressive and ruminative symptoms, and 2) whether executive function and coping contribute to age differences in the effects of the two AMT conditions on emotional state. To this end, we ran a series of repeated measures general linear models (GLMs), with time (before memory exposure, after memory exposure) as the repeated measure.

AMT Condition and Age Effects on Affect. We first ran a pair of repeated measures GLMs, one predicting positive affect changes from PA3 to PA4, and the second GLM predicting negative affect changes from NA3 to NA4. The predictors were condition (specific versus general) and a continuous measure of age (in years). These models also controlled for gender and the continuous measures of depressive symptoms and rumination. Both models initially included two-way interactions between age, condition, and the other predictors, but interactions that were not significant were removed from the final models. The left half of Table 3 presents the standardized parameter estimates for each model.

(Table 3 about here)

The repeated measures analysis predicting positive affect across time from recall condition and age revealed a significant interaction between condition and time, $F(1, 87) = 4.28$, $p = .04$. Simple effects tests to explore the nature of this interaction indicated that individuals in the specific condition experienced a marginally significant decrease in positive affect following the Memory Exposure, $F(1, 43) = 2.93$, $p = .09$, while there was no effect of general recall on positive affect, $F(1, 40) = .85$, $p = .36$. This pattern is captured in Figure 1. There was also a marginal interaction between ruminative symptoms and time, $F(1, 87) = 3.33$, $p = .07$; however,

while the univariate tests revealed that ruminative strategies were more strongly related to positive affect at PA3 ($\beta = .15, p = .20$) than at PA4 ($\beta = .04, p = .70$), neither of these univariate tests reached or approached significance. Finally, there was no effect of gender or depressive symptoms on positive affect across time.

(Figure 1 about here)

The repeated measures GLM of negative affect revealed no significant effects of condition, age, gender, or ruminative strategies on negative affect across time, but there was a significant main effect of depressive symptoms, $F(1, 87) = 9.76, p = .002$; individuals with higher depressive symptoms reported more negative affect both before and after the Memory Exposure task.

AMT Condition, Age, Emotion Regulation and Executive Function Predicting Affect. In the second set of analyses, to examine the contributions of executive function and emotion regulation over and above the effect of AMT condition and age, we added the number of perseverative errors that participants committed during the WCST, as well as the continuous measures of reappraisal and suppression, as additional predictors in the models. Depressive symptoms and a continuous measure of rumination were again included as control variables, but gender was removed from these models due to the number of predictors, and the fact that it was not a related predictor to any of our variables of interest in the first set of analyses. As in the first stage of inferential analyses, two pairs of GLMs were tested, one predicting change in positive affect over time (PA3 and PA4) and the other predicting negative affect across time (NA3 and NA4). The results of these models are shown in the right half of Table 3.

When executive function and emotion regulation scores are added to the model predicting positive affect, we find a marginal main effect of suppression, $F(1, 84) = 3.07, p = .08$, where higher suppressive symptoms were related to less positive affect across time. Counter to our predictions, we did not find any significant effects of reappraisal or executive function in relation to positive affect. Additionally, we again find a significant condition x time interaction, $F(1, 84) = 5.63, p = .02$. Simple effects tests reveal no effect of the General recall condition on affect over time, Wilk's Lambda = .94, $F(1, 37) = 2.26, p = .14$, while there was a marginal effect of the Specific recall condition, Wilk's Lambda = .93, $F(1, 41) = 2.85, p = .10$, indicating that specific recall was associated with a decrease in positive affect across time (see Figure 2). An analysis of the least squares means also revealed that individuals in the General condition had marginally lower positive affect before the Memory Exposure Task than did the Specific condition ($p = .10$), but there were no differences in positive affect between conditions following the Memory Exposure ($p = .65$).

(Figure 2 about here)

The analysis predicting positive affect also revealed a marginal main effect of age, $F(1, 84) = 3.36, p = .07$, such that older participants reported less positive affect both before and after the Memory Exposure task than did younger participants. Finally, there was a marginally significant main effect of depressive symptoms, $F(1, 84) = 3.29, p = .07$, where higher depressive symptoms were related to less positive affect across time. Rumination was not a significant predictor of positive affect in this analysis.

In the analysis predicting negative affect across time, there was a significant three-way interaction between suppression, condition, and time, $F(1, 82) = 7.51, p = 0.01$. Simple effects tests probing this interaction found that for individuals in the General condition, there was a marginal interaction between time and suppression, $F(1, 36) = 3.12, p = .09$, such that suppression was positively related to NA3 ($B = .12$) but was negatively related to NA4 ($B = -.12$) in the General condition. Conversely, there was a significant interaction between time and suppression in the Specific condition, $F(1, 40) = 4.16, p = .04$, such that suppression was related to lower negative affect at NA3 ($\beta = -.07$), but greater negative affect at NA4 ($\beta = .11$). For a representation of this three-way interaction, see Figure 3.

(Figure 3 about here)

This model also revealed a significant three-way interaction between executive function, age, and time, $F(1, 82) = 5.27, p = .03$. To examine the nature of this across time interaction, we plotted the relationship between executive function levels (at -1 SD, 0 SD, and +1 SD from the standardized executive function scores) by three age levels (at -1 SD, 0 SD, and +1 SD from the mean standardized age) across time (NA3 and NA4). The exploration of this interaction revealed that for younger participants, high executive function was related to decreased negative affect across time, while low executive function abilities was related to increased negative affect across time (see Figure 4). At the mean age, increased executive function was associated with higher negative affect at both time points (see Figure 5). Finally, for the older participants, low executive function was related to decreased negative affect from before and after the Memory

Exposure task, while high executive function was related to a slight increase in negative affect over time (see Figure 6).

(Figures 4, 5, and 6 about here)

Additionally, the model predicting negative affect indicated that there was a significant main effect of reappraisal, $F(1, 82) = 8.98, p = .004$; individuals who reported engaging in greater amounts of reappraisal reported more negative affect across time. Finally, there was a significant main effect of depressive symptoms, $F(1, 82) = 13.50, p = .0004$, where higher depressive symptoms were related to greater negative affect at both time points. There were no effects of rumination.

As it was surprising that higher levels of executive function in older children were associated with elevated levels of negative affect, we wanted to examine whether this was attributable to the nature of the memories provided by older and younger participants. Perhaps the memories of older participants were more likely to be of negative experiences than the provided memories by younger participants? To test this, we added the percentage of negative memories generated on the experimental portion of the AMT to the model. However, memory valence was not a significant predictor of affect, and the relationships between the variables of interest were not substantially altered by its inclusion.

DISCUSSION

Overall, our results provide some preliminary evidence that memory recall style impacts one's immediate emotional state, which is consistent with the argument put forth by the Affect Regulation Hypothesis. Indeed, individuals who were assigned to recall specific events

experienced decreased positive affect across time even when executive function and emotion regulation strategies were included in the model. Along with providing experimental support for the claim that overgeneral recall is more protective of emotional state than specific recall, this finding also connects to work that finds links between one's attributions and assessments of personal experiences to the development and maintenance of depression (e.g., Beck, 1976, Craighead, Sheets, Craighead, & Madsen, 2011; Segal & Swallow, 1994). In this way, our work provides additional evidence that the manner in which we view our experiences contributes to our emotional wellbeing.

It was expected that younger participants might be negatively impacted by specific recall to a greater extent than their older counterparts due to children's less developed emotion regulation and executive function abilities. Although we did not find age differences in the impact of recall condition on affect, we did find that across conditions, younger participants reaped emotional benefits from higher levels of executive function abilities, relative to younger participants with lower levels of executive function skills. This finding suggests that executive function, and in particular inhibition skills, may be particularly helpful for younger children when they are talking about negative past experiences. That being said, we were surprised that older participants with higher levels of executive function skills did not also reap emotional benefits, and there are several reasons why this may have occurred.

First, it is possible that the observed relationship between executive function and age is attributable to differences in the nature of the memories provided. It is possible that the intensity of the reported events by older participants was greater than the intensity of events reported by younger participants. If older participants did provide more negatively intense memories than younger participants, then older adults' memories may have generated higher levels of negative

affect with which they attempted to cope, thus drawing more heavily on their executive function and emotion regulation abilities. Further, it is also possible that the types of events that were reported may also have differed across participants. If older participants generated more highly aversive or traumatic memories than did the younger participants, then older participants would be placing more demands on their emotion regulation and executive function abilities than the younger participants, resulting in an overall higher level of negative affect with age. As one possible way to address this question in the future, analyses could examine the emotional content of the specific and general memories that were provided, according to individuals' age and executive function abilities.

Another possible reason for the increased negative affect following the Memory Exposure task in the older participants with high executive function abilities may be that older individuals with greater cognitive or regulatory skills may be more willing to allow themselves to experience aversive emotions, because they are more confident in their ability to adaptively cope over time with the emotions that are brought to the surface. Conversely, younger participants may be less willing to generate highly aversive emotions, as they are less willing or able to effectively cope with them. As this study examined immediate emotional reactions, it is possible that a longitudinal analysis would reveal that the older participants would demonstrate improved emotional responses, relative to children, over time. Indeed, the expressive writing literature reveals that in adults, individuals who disclose negative experiences report short-term negative reactions but long-term emotional, psychological, and physiological benefits (e.g., Pennebaker, Mehl, & Niederhoffer, 2003; Pennebaker, 1997). On a related note, some trauma victims who participate in trauma-focused research report immediate negative emotional

reactions to their participation, but these same individuals report long-term benefits from talking about their specific traumatic experiences (see Legerski & Bunnell, 2010 for a recent review).

It is also possible that the counterintuitive findings related to age, executive function, and emotional responses are attributable to the differential nature of recruitment for the participants in the college sample and the younger sample. As the college sample was recruited from an Introductory Psychology research pool in exchange for class credit, while the child sample individually volunteered to participate in the study and were paid \$20 across the two sessions, there may have been differences in motivation between the younger and older participants. In fact, age was negatively related to positive affect across conditions and time. While there are a number of factors that might have contributed to these differences, it is possible that the college-aged participants were less motivated and therefore felt less positive about their research participation. Conversely, the younger participants may have viewed the experiment very positively, given the monetary compensation and the purely voluntary nature of their participation, which may have elevated younger children's emotional states across conditions, therefore dampening any condition effects in the younger group.

Finally, the unexpected findings related to executive function, age, and emotion may be attributable to the executive function task that was employed. As the literature suggests that executive function differences on the WCST are often observed as differences in reaction time (Best & Miller, 2010), and our administration of the WCST was done by hand, we did not capture reaction time data. Thus, the lack of age-related differences in executive function in our sample may be due to the manner in which we assessed executive function abilities, rather than evidence of no difference in executive functions according to age.

In addition to age and condition effects, we were also interested in whether the manner in which individuals cope with emotional experiences would influence the impact of memory specificity on affect. We did find that both suppression and reappraisal were related to emotional responses. In terms of suppression, we found that in the Specific condition, suppression was related to increased negative affect over time, while the suppression tended to be related to decreased negative affect over time in the General condition. This pattern of results suggests that people who typically avoid emotional reactions have more negative responses in the Specific condition than less avoidant people, probably due to the fact that avoidance could not be effectively employed in the listening to one's specific memories. Interestingly, suppression was not related to baseline specificity, which may indicate that participants in our sample who reported higher levels of suppression had not developed an overgeneral recall style in response. Or, the lack of relationship between baseline specificity and suppression may be attributable to our measure of baseline specificity, which we address in more detail below.

We also found that the effect of condition according to time, both when emotion regulation and executive function abilities were in the model and when they were not, appears to be driven more by differences in the levels of positive affect before the Memory Exposure task (PA3) between the groups than by the resulting affect levels after the Memory Exposure task (PA4). While the average PA3 levels were not significantly different according to condition in either model, we should be careful in our interpretation of these effects; although the directional impact of specific and general recall on positive affect differed, the resulting affect levels did not.

A final result that was surprising was the positive relationship between reappraisal and negative affect across time and condition, as it was expected that individuals who were more

likely to reappraise or reframe their experiences would be better able to down-regulate their negative affect. However, it is possible that individuals who report using more emotion regulation strategies, such as reappraising and suppression, may also have more concurrent negative emotional experiences with which they need to cope. As such, individuals may report engaging in more reappraisal because they have more daily experiences that require it, which may be why individuals who reported higher use of reappraisal strategies also reported greater negative affect (at both NA3 and NA4), regardless of condition. However, another possible reason for the link between reappraisal and increased negative affect comes from an examination of the metric used to capture reappraisal strategies. The ERQ and ERQ-CA's reappraisal questionnaire asks participants to rate, on a scale of 1-7, the personal applicability of statements such as: "*When I want to feel less negative emotion, I change the way I'm thinking about the situation.*" While this type of question certainly asks about whether participants have thought about an event in a new way, this question does not require that the change in thinking is inherently positive. Therefore, while we would expect that thinking about an event in a new light would perhaps prompt some reflection and coping by the individual, it is also possible that individuals might be negatively reappraising their experiences. Thus, it would be helpful to examine differences in positive and negative reappraisal separately.

Finally, the emotion regulation questionnaire asks participants about how they respond to emotional events after they have occurred, not during. As the literature suggests that reappraisal results in modifying memory content, typically in a more positive light, any memories to which reappraisal has been applied may not have been elicited by our request for negative memories. As such, the memories that were generated are likely to be those that have not been positively reappraised, and they may be of events that are more negative, more intense, and harder to

reappraise than other types of experiences. More detailed content analyses of participants' memories may shed additional light on this possibility.

While our study suggests that overgeneral memory may provide an immediate emotional benefit, it is important to note that there is evidence that overgeneral memory recall is prospectively predictive of the development of depression (Raes, et al., 2006; van Minnen, Wessel, Verhaak, & Smeenk, 2005), and is related to longer-lasting depressive episodes (Brittlebank, Scott, Williams, & Ferrier, 1993; Peeters, Wessel, Merckelbach, & Boon-Vermeeren, 2002). Overgeneral memory may have long-term negative implications for wellbeing because the avoidance of specific past experiences in memory may limit one's ability to draw on those specific events to inform future problem-solving (Evans, Williams, O'Loughlin, & Howells, 1992; Williams & Broadbent, 1986; Williams et al., 2006). In fact, this mechanism is thought to be responsible for the well-established finding that overgeneral memory is more likely in depressed patients than non-depressed controls (e.g., Valentino, Toth, & Cicchetti, 2009; Dalglish et al., 2007). Given these extended negative consequences, investigations that examine the time course of when this short-term coping strategy shifts from an emotionally beneficial to a maladaptive emotion regulation approach for the individual are needed.

Although our study is the first to date to examine the impact of experimentally manipulated recall style on affect, our general pattern of findings revealed a number of marginally significant effects. It is possible that our 80% power analysis was not conservative enough. Additionally, we drew our estimates of affect level changes on the PANAS and PANAS-C from studies that included a sample of 9-12 year olds and 18-25 year olds, and it is possible that the inclusion of adolescent participants in our sample (age 13-17 years) made this power estimate not fully appropriate for our analyses.

Williams and colleagues suggest that individuals with highly aversive negative experiences are particularly at risk for developing an overgeneral memory style, as an avoidant coping mechanism. Our work suggests that younger individuals with less developed executive function abilities, and individuals with higher suppressive tendencies, respond more negatively to the recall of specific negative past experiences, which may put these individuals at higher risk of adopting an overgeneral recall style over time, as they may be less able or willing to cope with the negative feelings elicited by negative memories.

Although our examination of baseline specificity levels did not explain the observed relationships related to condition, age and affect, we also did not see much overall variability in baseline specificity. It is possible that because we used a non-traumatized sample, individuals may not have had highly aversive experiences that might have prompted the development of overgenerality. Secondly, our baseline specificity measure may not have been strong enough to assess differences: As this measurement was based on only five memories, the inclusion of a larger sample of memories at baseline would have presumably increased variation. Additionally, as there is some evidence that the likelihood of overgeneral recall increases across the length of the task (e.g., Roberts & Carlos, 2006), five memories may not have been sufficient to prompt individuals to shift into their general recall style, if they were likely to do so.

This study suggests a short-term emotional benefit of avoidance through general recall. However, given the long-term negative implications of such an approach to recall, an assessment of overgeneral memory might be one quick and inexpensive way to target individuals with trauma histories who may need additional assistance in coping with the emotions associated with their past over time. Our results may also inform the manner in which we talk with child and adolescent trauma victims about their negative experiences. As many counseling and

intervention approaches, such as critical debriefing, involve encouraging the individual to talk about the specific events, we should be particularly sensitive to the short-term negative emotional impact that this approach can have on the individual at the time, in order to encourage individuals to reflect on the elicited emotions and reap the long-term benefits of discussing negative emotional events. Taken as a whole, this study provides the first experimental evidence for the role of memory specificity in regulating affect. We found that individual differences in age, emotion regulation strategies, and executive function abilities impact the emotional experience of talking about aversive experiences. Consistent with the perspective that the way in which we remember our past has implications for our current and future emotional wellbeing, our research provides additional insight into the development of autobiographical memory styles and the links between the quality of remembering and emotional wellbeing.

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Table 1. Means and Standard Deviations of Variables of Interest According to Condition

Variable	<u>Specific Condition</u>		<u>General Condition</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (in years)	16.71	4.31	15.62	3.85
Baseline Memory Task:				
% Specificity	77.07	19.68	81.51	19.29
% Negative Memories	95.65	10.25	93.26	14.26
Experimental Memory Task:				
% Negative Memories	95.54	16.59	90.38	19.30
# Autobiographical Mems	14.35	.90	14.39	.92
Average Positive Affect:				
PA1	3.08	.80	3.02	.73
PA2	2.82	.76	2.71	.79
PA3	2.86	.87	2.68	.89
PA4	2.54	.84	2.57	.96
Average Negative Affect:				
NA1	1.26	.34	1.30	.26
NA2	1.45	.49	1.45	.48
NA3	1.26	.43	1.30	.37
NA4	1.30	.41	1.37	.39
# Perseverative Errors	8.04	3.88	7.09	2.82
Reappraisal (max. score = 42)	29.69	6.26	30.57	5.22
Suppression (max. score = 28)	14.02	3.33	12.98	5.42
% Time Spent Ruminating	50.65	12.98	52.42	12.68
Depressive Symptoms	13.67	7.42	14.51	9.62

Table 2. Correlations between Variables of Interest and Control Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	1.00	-.03	-.18 ^b	-.21*	-.20 ^a	.10	-.20 ^a	.10	-.14	-.001	.01	-.15	.07
2. Baseline Specificity		1.00	-.17	-.05	-.13	-.04	-.07	-.04	-.14	-.04	.001	-.06	.01
3. Baseline % Neg. Memories			1.00	.32**	.19 ^b	.09	.15	.13	-.05	.10	.03	.13	.01
4. Experimental % Neg. Memories				1.00	.12	-.03	.13	-.02	-.28**	.001	-.12	.08	.13
5. PA3					1.00	.07	.88***	.01	-.06	.12	-.13	.06	-.14
6. NA3						1.00	.13	.73***	-.10	.12	.05	.23*	.41***
7. PA4							1.00	-.08	-.07	.06	-.18 ^b	-.02	-.12
8. NA4								1.00	-.19 ^b	.19 ^b	-.09	.31**	.43***
9. Perseverative Errors									1.00	-.05	.19 ^b	-.09	-.14
10. Reappraisal										1.00	-.13	-.16	-.22*
11. Suppression											1.00	.12	-.09
12. Rumination												1.00	.44***
13. Depressive Symptoms													1.00

*** $p < .001$, ** $p < .01$, * $p < .05$, ^a $p < .07$, ^b $p < .10$. NOTE: Age has been partialled from these correlations.

Table 3. Standardized Parameter Estimates for Models Predicting Positive and Negative Affect

Variable	Condition and Age		Addition of ER and EF	
	Pos. Affect β	Neg. Affect β	Pos. Affect β	Neg. Affect β
Condition (β_{OG})	-.06	.14	-.22	.06
Condition x Time				
Before	-.17	---	-.34 ^b	---
After	.04	---	-.09	---
Age	-.16	.01	-.19 ^a	.09
Gender (β_{male})	.34	.09	---	---
Depressive Symptoms	-.17	.31**	-.21 ^a	.38***
Rumination	.10	.12	.14	.12
Rumination x Time				
Before	.15	---	---	---
After	.05	---	---	---
Perseverative Errors	---	---	-.09	-.06
Perseverative Errors x Age	---	---	---	-.04
Before	---	---	---	.05
After	---	---	---	-.12
Reappraisal	---	---	.04	.28**
Suppression	---	---	-.18 ^a	.01
Suppression x Condition	---	---	---	.04
Before	---	---	---	.27
After	---	---	---	-.20

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, ^a $p \leq .07$, ^b $p \leq .10$

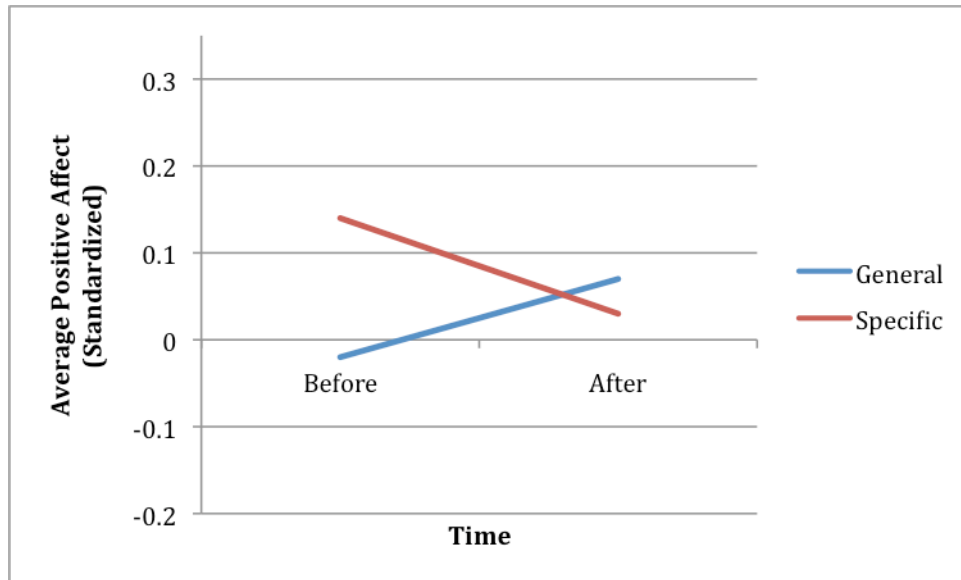


Figure 1. Positive Affect Before and After the Memory Exposure Task According to Condition.

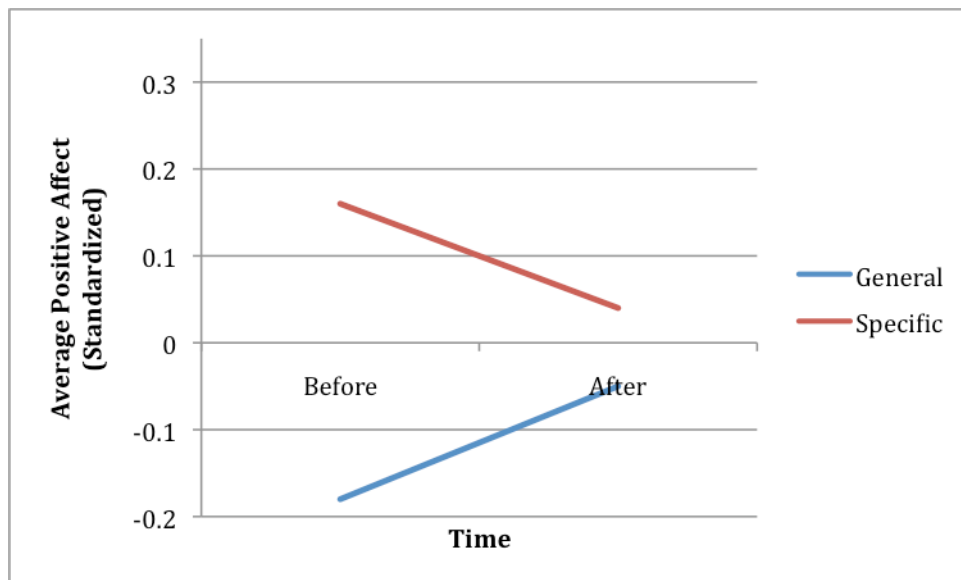


Figure 2. Interaction between Condition and Time Predicting Positive Affect when Emotion Regulation and Executive Function Abilities are Included.

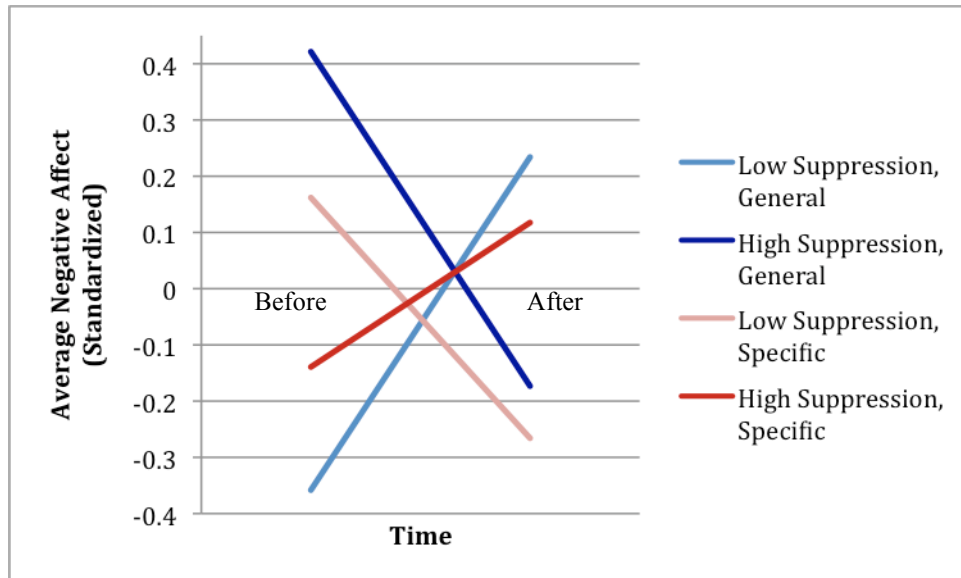


Figure 3: Interaction between Suppression and Condition Across Time. Blue lines indicate participants' negative affect in the General condition, and the Red lines indicate participants' negative affect in the Specific condition.

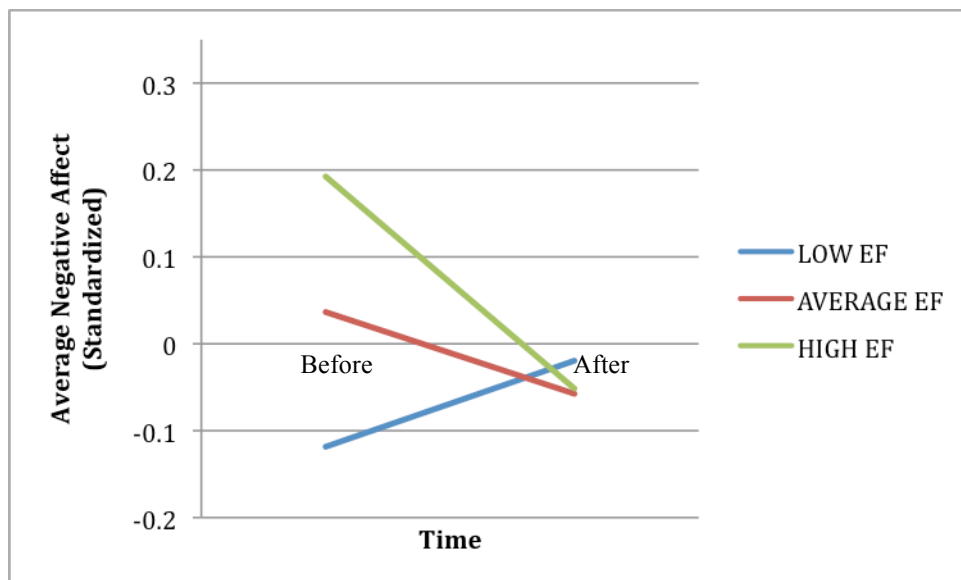


Figure 4. The Relationship between Executive Function (EF) levels and Time in Younger Participants (-1 *SD* from average age). Low, average, and high levels of executive function skills are depicted across time.

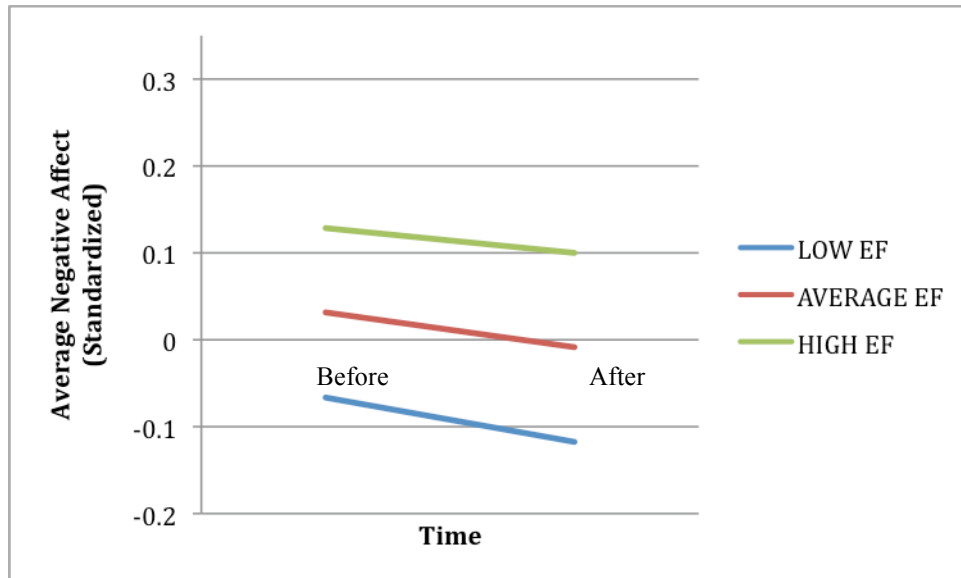


Figure 5. The Relationship between Executive Function (EF) levels and Time at the Average Age of Participant (0 *SD* from average age). Low, average, and high levels of executive function skills are depicted across time.

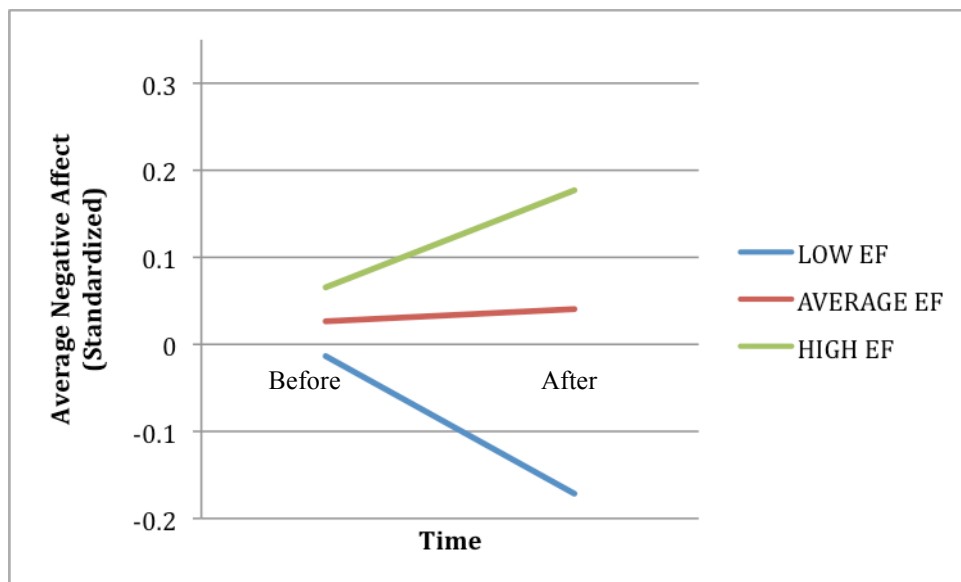


Figure 6. The Relationship between Executive Function (EF) levels and Time in Older Participants (+1 *SD* from average age). Low, average, and high levels of executive function skills are depicted across time.

Appendix A: Autobiographical Memory Task

Instructions for the Baseline Cue Words:

“This is an autobiographical memory experiment, and the procedure is very straightforward, and goes as follows. For the first part of this task, I’ll be showing you a series of 5 words. Each word is printed on a separate card. Each word is the name of a trait or personal characteristic. Most of us exhibit or display each of these traits at one time or another. When I show you each trait word, what I’d like you to do is to think of a time when you exhibited or displayed the trait in question. The memory you retrieve should be very specific. That is, it should refer to a particular occurrence when you displayed the trait. So, for example, if the trait word were excitable, you might say “I was really excited last Sunday when I was watching the football game on TV.” That would be a specific personal memory because it referred to a particular event on a particular day when you displayed the trait. If you had said, “I always get excited when I watch football on TV” you would not have stated a specific personal memory because the memory did not refer to any specific event but rather to “watching football games in general”.

*So, for each word, we want you to think of a specific personal memory – a time when you displayed the trait in question. Although we want you to answer as quickly as you can, the most important thing is to answer with a specific memory, not a general memory. As soon as you think of a specific instance, I want you to describe it out loud, briefly. I’ll be timing how quickly you can recall a specific memory with this stopwatch. I’ll be giving you up to 60 seconds for each word. I’ll also record your responses on this tape recorder. **Be sure you say the word out loud before providing your memory.** Any questions?”*

If the participant does not provide a specific memory, researchers may prompt the participant up to two times with the phrase: *“Can you tell me a specific personal memory about [cue word]?”*

Cue words for the baseline recall: *stress, argue, punishment, conflict, and frustrate*

Instructions for the Specific Recall Condition:

You will now be shown another 10 cue words. For this part of the task, the memory you retrieve should also be very specific. That is, it should refer to a particular occurrence when you displayed the trait. So, for example, if the trait word were impatient, you might say: “I was really impatient yesterday when I was waiting for dinner to be ready.” That would be a specific personal memory because it referred to a particular event on a particular day when you displayed the trait. If you had said, “I’m always impatient when I am waiting for dinnertime to arrive” you would not have stated a specific personal memory because the memory did not refer to any specific event but rather to “dinnertime in general”.

*So, for each word, we want you to think of a specific personal memory – a time when you displayed the trait in question. Although we want you to answer as quickly as you can, the most important thing is to answer with a specific memory, not a general memory. As soon as you think of a specific instance, I want you to describe it out loud, briefly. **Be sure you say the word out loud before providing your memory.** Any questions?”*

If the participant does not provide a specific memory, researchers may prompt the participant up to two times with the phrase: “*Can you tell me a specific personal memory about [cue word]?*”

Cue words for the specific recall condition: *sorry, angry, clumsy, hurt, lonely, unhappy, bored, failed, scared, hate, depressed, upset, abandoned, disgusted, and gloomy*

Instructions for the Overgeneral Recall Condition:

You will now be shown another 10 cue words. For this part of the task, the memory you retrieve should be of a certain category of event; in other words, a series of similar events that happened to you at different times. So, if I said that word “impatient,” it would not be okay to say “I was really impatient yesterday when I was waiting for dinner to be ready,” because that does not refer to a category of events. But it would be okay to say “I’m always impatient when I am waiting for dinnertime to arrive” because that refers to a category of events – dinnertime in general.

*So, for each word, we want you to think of a category of personal events – a series of times when you displayed the trait in question. Although we want you to answer as quickly as you can, the most important thing is to answer with a category of events, not a one-time event. As soon as you think of a series of instances, I want you to describe it out loud, briefly. I’ll be timing how quickly you can recall a category of events with this stopwatch. **Be sure you say the word out loud before providing your memory.** Any questions?”*

If the participant does not provide a general memory, researchers may prompt the participant up to two times with the phrase: “*Can you tell me a category of personal memories about [cue word]?*”

Cue words for the specific recall condition: *sorry, angry, clumsy, hurt, lonely, unhappy, bored, failed, scared, hate, depressed, upset, abandoned, disgusted, and gloomy*

Appendix B: Adult Distress Assessment – PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to each word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

Feeling or Emotion	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	1	2	3	4	5
Irritable	1	2	3	4	5
Distressed	1	2	3	4	5
Alert	1	2	3	4	5
Excited	1	2	3	4	5
Ashamed	1	2	3	4	5
Upset	1	2	3	4	5
Inspired	1	2	3	4	5
Strong	1	2	3	4	5
Nervous	1	2	3	4	5
Guilty	1	2	3	4	5
Determined	1	2	3	4	5
Scared	1	2	3	4	5
Attentive	1	2	3	4	5
Hostile	1	2	3	4	5
Jittery	1	2	3	4	5
Enthusiastic	1	2	3	4	5
Active	1	2	3	4	5
Proud	1	2	3	4	5
Afraid	1	2	3	4	5

Appendix C: Child Distress Assessment - PANAS-C

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word. Indicate to what extent you feel this way right now, that is, at the present moment.

Feeling or Emotion	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	1	2	3	4	5
Sad	1	2	3	4	5
Frightened	1	2	3	4	5
Alert	1	2	3	4	5
Excited	1	2	3	4	5
Ashamed	1	2	3	4	5
Upset	1	2	3	4	5
Happy	1	2	3	4	5
Strong	1	2	3	4	5
Nervous	1	2	3	4	5
Guilty	1	2	3	4	5
Energetic	1	2	3	4	5
Scared	1	2	3	4	5
Calm	1	2	3	4	5
Miserable	1	2	3	4	5
Jittery	1	2	3	4	5
Cheerful	1	2	3	4	5
Active	1	2	3	4	5
Proud	1	2	3	4	5
Afraid	1	2	3	4	5
Joyful	1	2	3	4	5
Lonely	1	2	3	4	5
Mad	1	2	3	4	5
Fearless	1	2	3	4	5
Disgusted	1	2	3	4	5
Delighted	1	2	3	4	5
Blue	1	2	3	4	5
Daring	1	2	3	4	5
Gloomy	1	2	3	4	5
Lively	1	2	3	4	5

Appendix D: Emotion Regulation Questionnaire (ERQ)

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1-----2-----3-----4-----5-----6-----7
 strongly neutral strongly
 disagree agree

1. _____ When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*.
2. _____ I keep my emotions to myself.
3. _____ When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about*.
4. _____ When I am feeling *positive* emotions, I am careful not to express them.
5. _____ When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.
6. _____ I control my emotions by *not expressing them*.
7. _____ When I want to feel more *positive* emotion, I *change the way I'm thinking about the situation*.
8. _____ I control my emotions by *changing the way I think about the situation I'm in*.
9. _____ When I am feeling *negative* emotions, I make sure not to express them.
10. _____ When I want to feel less *negative* emotion, I *change the way I'm thinking about the situation*.

Appendix E: Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)

We would like to ask you some questions about your thoughts and feelings, in particular, how you control your feelings. The questions below involve two types of emotions. One is your emotional experience, or what you feel inside. The other is your emotional expression, or how you show your emotions in the way you talk or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1-----2-----3-----4-----5-----6-----7
 strongly neutral strongly
 disagree agree

1. _____ When I want to feel more *positive* emotion (such as joy), I *change what I'm thinking about*.
2. _____ I keep my emotions to myself.
3. _____ I control my negative feelings about things by *changing what I'm thinking about*.
4. _____ When I am feeling *positive* emotions, I am careful not to show them.
5. _____ When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.
6. _____ I control my emotions by *not showing them*.
7. _____ When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation.
8. _____ I control my emotions by *changing the way I think* about the situation I'm in.
9. _____ When I am feeling *negative* emotions, I make sure not to show them.
10. _____ When I want to feel less *negative* emotion, I *change the way I'm thinking* about the situation.

Appendix F: CES-D

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way *during the past week*.

	Rarely or none of the time less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I did not feel like eating; my appetite was poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I felt that I could not shake off the blues even with help from my family or friends.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I felt I was just as good as other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I had trouble keeping my mind on what I was doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I felt depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I felt that everything I did was an effort.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I felt hopeful about the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I thought my life had been a failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I felt fearful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My sleep was restless.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I was happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I talked less than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I felt lonely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. People were unfriendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I enjoyed life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I had crying spells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I felt sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I felt that people dislike me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I could not get "going."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix G: CES-DC

Below is a list of the ways you might have felt or acted. Please check how much you have felt this way during the past week.

During the past week:	Not at all	A little	Some	A Lot
1. I was bothered by things that usually don't bother me.	_____	_____	_____	_____
2. I did not feel like eating, I wasn't very hungry.	_____	_____	_____	_____
3. I wasn't able to feel happy, even when my family or friends tried to help me feel better.	_____	_____	_____	_____
4. I felt like I was just as good as other kids.	_____	_____	_____	_____
5. I felt like I couldn't pay attention to what I was doing.	_____	_____	_____	_____

During the past week:	Not at all	A little	Some	A Lot
6. I felt down and unhappy.	_____	_____	_____	_____
7. I felt like I was too tired to do things.	_____	_____	_____	_____
8. I felt like something good was going to happen.	_____	_____	_____	_____
9. I felt like things I did before didn't work out right.	_____	_____	_____	_____
10. I felt scared.	_____	_____	_____	_____

During the past week:	Not at all	A little	Some	A Lot
11. I didn't sleep as well as I usually sleep.	_____	_____	_____	_____
12. I was happy.	_____	_____	_____	_____
13. I was more quiet than usual.	_____	_____	_____	_____
14. I felt lonely, like I didn't have any friends.	_____	_____	_____	_____
15. I felt like kids I know were not friendly or that they didn't want to be with me.	_____	_____	_____	_____

During the past week:	Not at all	A little	Some	A Lot
16. I had a good time.	_____	_____	_____	_____
17. I felt like crying.	_____	_____	_____	_____
18. I felt sad.	_____	_____	_____	_____
19. I felt people didn't like me.	_____	_____	_____	_____
20. It was hard to get started doing things.	_____	_____	_____	_____

Appendix H: Rumination Response Scale (RRS)

People think and do many different things when they feel sad, blue, or depressed. Below is a list of possibilities. Please indicate if you never, sometimes, often, or always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do.

How often do you think or do the following when you feel down, sad, or depressed:

	Not at all	A little	Some	A Lot
1. Think about how alone you feel.	_____	_____	_____	_____
2. Think "I won't be able to do my job if I don't snap out of this."	_____	_____	_____	_____
3. Think about your feelings of fatigue and achiness.	_____	_____	_____	_____
4. Think about how hard it is to concentrate.	_____	_____	_____	_____
5. Think "What am I doing to deserve this?"	_____	_____	_____	_____
6. Think about how passive and unmotivated you feel.	_____	_____	_____	_____
7. Analyze recent events to try to understand why you are depressed.	_____	_____	_____	_____
8. Think about how you don't seem to feel anything anymore.	_____	_____	_____	_____
9. Think "Why can't I get going?"	_____	_____	_____	_____
10. Think "Why do I always react this way?"	_____	_____	_____	_____
11. Go away by yourself and think about why you feel this way.	_____	_____	_____	_____
12. Write down what you are thinking and analyze it.	_____	_____	_____	_____
13. Think about a recent situation, wishing it had gone better.	_____	_____	_____	_____
14. Think "I won't be able to concentrate if I keep feeling this way."	_____	_____	_____	_____
15. Think "Why do I have problems other people don't have?"	_____	_____	_____	_____
16. Think "Why can't I handle things better?"	_____	_____	_____	_____
17. Think about how sad you feel.	_____	_____	_____	_____
18. Think about all your shortcomings, failings, faults, and mistakes.	_____	_____	_____	_____
19. Think about how you don't feel up to doing anything.	_____	_____	_____	_____
20. Analyze your personality to try to understand why you are depressed.	_____	_____	_____	_____
21. Go someplace alone to think about your feelings.	_____	_____	_____	_____
22. Think about how angry you are with yourself.	_____	_____	_____	_____

Appendix I: Children's Response Styles Questionnaire (CRSQ)

People think and do many different things when they feel sad, blue, or depressed. Below is a list of possibilities. Please indicate if you never, sometimes, often, or always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do.

How often do you think or do the following when you feel down, sad, or depressed:

	Not at all	A little	Some	A Lot
1. When I am sad, I think about a recent situation wishing it had gone better.	_____	_____	_____	_____
2. When I am sad, I go away by myself and think about why I feel this way.	_____	_____	_____	_____
3. When I am sad, I think: "Why can't I handle things better?"	_____	_____	_____	_____
4. When I am sad, I go someplace alone to think about my feelings.	_____	_____	_____	_____
5. When I am sad, I think: "Why do I always react this way?"	_____	_____	_____	_____
6. When I am sad, I think about recent event to try to understand why I feel this way.	_____	_____	_____	_____
7. When I am sad, I think: "Why do I have problems others don't have?"	_____	_____	_____	_____
8. When I am sad, I write down what I am thinking and try to understand these thoughts.	_____	_____	_____	_____
9. When I am sad, I think: "What am I doing to deserve this?"	_____	_____	_____	_____
10. When I am sad, I reflect on myself and try to understand why I am depressed."	_____	_____	_____	_____

Appendix J: Demographic Questionnaire

1) Ethnicity: _____

(2) Gender: Male Female

(3) Date of Birth: _____

(4) Age: _____

(5) What grade are you in? (e.g. 2nd grade or sophomore year in college):
